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EXAMINER

WANG, JIN CHENG

ART UNIT

PAPER NUMBER

2628

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Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 09/823,935 | Applicant(s) PETERSON ET AL. | |
| | Examiner Jin-Cheng Wang | Art Unit 2628 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 14-32, 41-48, 86, 88 and 91 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 14-32, 41-48, 86, 88 and 91 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>7/24/06 & 4/25/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's submission filed on 7/3/2006 has been entered. Claims 1, 3, 4, 14, 15, 41, 42, and 86 have been amended. Claims 7-13, 33-40, 49-85, 87, 89-90 and 92-97 have been canceled. Claims 1-6, 14-32, 41-48, 86, 88 and 91 are pending in the application.

Response to Arguments

Applicant's arguments have been considered, but are not found persuasive for the reasons given below.

Applicant's arguments with respect to claims 1-32, 41-48, 63-86, 88 and 91 have been considered but are moot in view of the new ground(s) of rejection based on Sato et al. U.S. Pat. No. 6,731,301.

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel including calculating one sample value, two sample values, three sample values and then four sample values for a sampling pattern for each pixel. Therefore, Sato teaches or suggests the claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Moreover, applicant's method claim includes the term "comprising". Sato has four samples for each pixel and Sato's calculation includes calculating the first sample for each pixel, followed by calculating the second sample for each pixel and thereby calculating two samples for each pixel as an intermediate result in his calculation step.

It would have been obvious to one of the ordinary skill in the art to have calculated two samples values of the four samples in a sample pattern, either one-by-one sample consecutively or by pair-wise samples simultaneously, in whatever manner. This calculation does not make it distinct from the prior art Sato reference because Sato calculates four sample values including calculating two sample values. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

is subject to the broadest reasonable interpretation consistent with the specification. During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can

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be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, one of the ordinary skill in the art would have realized that calculating four sample values also includes the step of calculating less than three sample values because the final calculation result from the step of calculating four sample values includes the intermediate result from the step of calculating less than three sample values. This kind of calculation is well known to one of the ordinary skill in the art. One of the ordinary skill in the art would have been motivated to construct an intermediate step for calculating the four sample values including the intermediate step of calculating less than three sample values wherein less than three sample values form a sampling pattern for the calculation purposes.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 41-48, 88 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

For example, the base claim 41 recites, “a pixel considered as divided evenly into a **four-by-four array** of sub-regions each sampling pattern having less than three sample locations relative to a pixel, each sample location located at one of four candidate sampling locations.”

However, applicant’s specification does not disclose selecting two sample locations from four candidate sampling locations. See Figs. 3-9 wherein four sample locations are selected from the 4 by 4 subpixels for each pixel. The candidate sampling locations are 16 instead of 4 as claimed. There is no such thing as to “each sampling pattern having less than three sample locations” when a four-by-four array of sub-pixels for each pixel is considered.

Therefore, these claim limitations set forth in the claim 41 are not described in the specification in such a way that as to reasonably convey to one of the ordinary skill in art had possession of the claimed invention.

To comply with the “written description” requirement of 35 U.S.C. 112, first paragraph, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the “written description” inquiry, whatever is now claimed. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). For purposes of written description, one shows “possession” by descriptive means such as words, structures, figures, diagrams, and

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formulas that fully set forth the claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997). Such descriptive means cannot be found in the disclosure for the inventions of the base claim 41.

Claim 42 is subject to the same rationale of rejection set forth in the claim 41.

The claims 43-48 depend upon the claim 42 and are rejected due to their dependency on the claim 42.

The claim 88 depends upon the claim 86 while the base claim 86 is amended to recite, “sampling at only two sample locations relative to a pixel” and the claim 88 recites “a sampling pattern is considered as dividing a given pixel into a four-by-four array of sub-pixels” and “four potential sampling positions”.

However, applicant’s specification does not describe a combination of these limitations in a single embodiment. Therefore, these claim limitations set forth in the claim 88 are not described in the specification in such a way that as to reasonably convey to one of the ordinary skill in art had possession of the claimed invention.

To comply with the “written description” requirement of 35 U.S.C. 112, first paragraph, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the “written description” inquiry, whatever is now claimed. *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). For purposes of written description, one shows “possession” by descriptive means such as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. *Lockwood v. American Airlines, Inc.*, 107

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F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997). Such descriptive means cannot be found in the disclosure for the inventions of the base claim 88.

Due to the 112 rejection to the claims set forth in above, the prior art rejection of the claims 41-48 and 88 are based on the claim limitations best understood by the Examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 23-28 and 91 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato).

Claim 23:

(1) Sato teaches a method for calculating values for pixels of an image having the pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with a plurality of sampling rates, the sampling rate differing for at least two pixels of the image (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the vertical direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the*

predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14; moreover, Fig. 32 also shows two sampling rates for pixels along the y-axis wherein each pixel has 2 by 2 matrix of sub-pixels); and

Calculating values for pixels of the image from a respective calculated sample values (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 24:

The claim 24 encompasses the same scope of invention as that of claim 23 except additional claimed limitation of the sampling rate alternating per pixel for consecutive pixels along lines parallel to one or the other axes of the image for at least some of the horizontal or vertical lines of pixels of the image.

However, Sato further discloses the claimed limitation of the sampling rate alternating per pixel for consecutive pixels along lines parallel to one or the other axes of the image for at least some of the horizontal or vertical lines of pixels of the image (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

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Claim 25:

The claim 25 encompasses the same scope of invention as that of claim 23 except additional claimed limitation of the sampling rate being constant for the pixels arranged along any given line parallel to the first axis and varies among the plurality of sampling rates for the pixels arranged along any given line parallel to the second axis.

However, Sato further discloses the claimed limitation of the sampling rate being constant for the pixels arranged along any given line parallel to the first axis and varies among the plurality of sampling rates for the pixels arranged along any given line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 26:

The claim 26 encompasses the same scope of invention as that of claim 25 except additional claimed limitation of the first and second sampling rates alternating per pixel for consecutive pixels in any line parallel to the second axis.

However, Sato further discloses the claimed limitation of the first and second sampling rates alternating per pixel for consecutive pixels in any line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the*

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predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14).

Claim 27:

(1) Sato teaches a method for calculating values for pixels of an image having the pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with first and second sampling rates, the sampling rate remaining constant for consecutive pixels arranged along any one given line parallel to the first axis and varying between the first and second sampling rates for consecutive pixels arranged along any one given line parallel to the second axis (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the vertical direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14; moreover, Fig. 32 also shows two sampling rates for pixels along the y-axis wherein each pixel has 2 by 2 matrix of sub-pixels; SEE ALSO FIG. 34 for the plurality of pixels along the y-axis wherein the column of pixels are sampled at different rates*); and

Calculating values for pixels of the image from a respective calculated sample values (see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).

Claim 28:

The claim 28 encompasses the same scope of invention as that of claim 27 except additional claimed limitation of the pixels of the image being arranged in rows parallel to the first axis and columns parallel to the second axis, and the first and second sampling rates alternating every row of pixels. However, Sato further discloses the claimed limitation of the pixels of the image being arranged in rows parallel to the first axis and columns parallel to the second axis, and the first and second sampling rates alternating every row of pixels (*Sato discloses in Figs. 34-26 the variable sampling rates for pixels along the y-direction and selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34-36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 91:

The claim 91 encompasses the same scope of invention as set forth in claim 27 except additional claimed limitation of an apparatus for rendering of an image. However, Sato further discloses the claimed limitation of an apparatus for rendering of an image (see Figs. 2-22).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-6, 14-22, 41-48, and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato).

2. Claim 1:

(1) Sato teaches a method for calculating values for pixels of an image, comprising:

Calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel, the sampling pattern for consecutive pixels alternating between a first and a second sampling pattern, wherein the calculation includes calculating a pair of sample values for pixels of an image in accordance with a sampling pattern for each pixel (*Sato teaches sampling patterns for adjacent pixels wherein the sampling patterns alternate between two different patterns selected from the pattern table for a plurality of pixels in an image and calculating four sample values for pixels of an image including calculating a pair of sample values for pixels of an image; see Figs. 26, 29, 34, 36, and 38*); each sampling pattern defining one or more sampling locations at which sample values are calculated, the sampling locations being relative to a pixel (*e.g., Sato teaches each sampling pattern having sample locations arranged within a 4 by 4 sub-pixel matrix relative to a pixel; Figs. 24-38; col. 2, 4, 8, 11-12; 13-14*); and

Determining a value for at least one pixel by combining sample values calculated for the sampling locations for the pixel (*e.g., Sato teaches determining the pixel values from the sample locations to avoid anti-aliasing effect; Figs. 24-38; col. 2, 4, 8-10, 11-12; 13-14*).

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel including calculating one sample value, two sample values, three sample values and then four sample values for a sampling pattern for each pixel. Therefore, Sato teaches or suggests the claim limitation of “calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Moreover, applicant’s method claim includes the term “comprising”. Sato has four samples for each pixel and Sato’s calculation includes calculating the first sample for each pixel, followed by calculating the second sample for each pixel and thereby calculating two samples for each pixel as an intermediate result in his calculation step.

It would have been obvious to one of the ordinary skill in the art to have calculated two samples values of the four samples in a sample pattern, either one-by-one sample consecutively or by pair-wise samples simultaneously, in whatever manner. This calculation does not make it distinct from the prior art Sato reference because Sato calculates four sample values including calculating two sample values. Applicant’s claim limitation does not recite “calculating only two sample values for each pixel wherein each pixel only has two samples”. The claim limitation of “calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel” set forth in the claim 1 is subject to the broadest interpretation consistent with applicant’s specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted “in view of the specification” without importing limitations from the specification into the claims unnecessarily). *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (“During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

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Therefore, in view of Sato, one of the ordinary skill in the art would have realized that calculating four sample values also includes the step of calculating less than three sample values because the final calculation result from the step of calculating four sample values includes the intermediate result from the step of calculating less than three sample values. This kind of calculation is well known to one of the ordinary skill in the art. One of the ordinary skill in the art would have been motivated to construct an intermediate step for calculating the four sample values including the intermediate step of calculating less than three sample values.

Claim 2:

The claim 2 encompasses the same scope of invention as that of claim 1 except additional claimed limitation that each sampling pattern defines two sample locations and calculating sample values comprises calculating a pair of sample values whenever sample values for a pixel are calculated in accordance with the first or second sampling pattern, the sampling patterns alternating from one pixel to the next.

However, Sato further discloses the claimed limitation that each sampling pattern defines two sample locations and calculating sample values comprises calculating a pair of sample values whenever sample values for a pixel are calculated in accordance with the first or second sampling pattern, the sampling patterns alternating from one pixel to the next (at least two sampling locations are defined and calculated for each sampling pattern in accordance with the first or second sampling pattern; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).

Claim 3:

The claim 3 encompasses the same scope of invention as that of claim 2 except additional claimed limitation that the pixels of the image are arranged along rows and columns parallel to first and second perpendicular axes, respectively, and the pair of sample locations per sampling pattern for at least two pixels are arranged along a line parallel to neither axis.

However, Sato further discloses the claimed limitation that the pixels of the image are arranged along rows and columns parallel to first and second perpendicular axes, respectively, and the pair of sample locations per sampling pattern for at least two pixels are arranged along a line parallel to neither axis (*e.g., the horizontal and vertical axes are in parallel with the rows and columns of the pixels and a diagonal line of the 4 by sub-pixel matrix; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 4:

The claim 4 encompasses the same scope of invention as that of claim 2 except additional claimed limitation of calculating a pair of sample values comprises calculating sample values at sample positions arranged according to either a first or second sample pattern, the first sampling pattern having sample positions on opposite sides of a line parallel to a first axis and dividing a respective pixel region in two, and the second sampling pattern having sample positions on opposite sides of a line parallel to a second axis and dividing a respective pixel region in two, the second axis perpendicular to the first axis.

However, Sato further discloses the claimed limitation that calculating sample values at sample positions arranged according to either a first or second sample pattern, the first sampling pattern having sample positions on opposite sides of a line parallel to a first axis and dividing a respective pixel region in two, and the second sampling pattern having sample positions on

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opposite sides of a line parallel to a second axis and dividing a respective pixel region in two, the second axis perpendicular to the first axis (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

Claim 5:

The claim 5 encompasses the same scope of invention as that of claim 4 except additional claimed limitation of the two lines parallel to the respective axes pass through the centers of respective pixels. However, Sato further discloses the claimed limitation that the pixels of the two lines parallel to the respective axes pass through the centers of respective pixels (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

Claim 6:

The claim 6 encompasses the same scope of invention as that of claim 5 except additional claimed limitation that each sampling pattern has a sample position on each side of both of two lines parallel to respective axes and passing through the center of respective pixels.

However, Sato further discloses the claimed limitation that each sampling pattern has a sample position on each side of both of two lines parallel to respective axes and passing through

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the center of respective pixels (*the first axis is the x-axis and the second axis is the y-axis*).

Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).

3. Claim 14:

Sato teaches a method for generating an image having pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating pairs of sample values for pixels of the image in accordance with a plurality of sampling patterns, one sampling pattern per pixel, one pair of sampling points per sampling pattern (*Sato discloses calculating pairs of sample values for pixels in accordance to the at least two different sampling patterns see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*); and

Calculating a value for at least one pixel of the image from a respective pair or pairs of calculated sample values (*Sato discloses determining the pixel values from the four sample locations for each pixel see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel including calculating one sample value, two sample values, three sample values and then four sample values for a sampling pattern for each pixel. Therefore, Sato teaches or suggests the claim limitation of “calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Moreover, applicant’s method claim includes the term “comprising”. Sato has four samples for each pixel and Sato’s

calculation includes calculating the first sample for each pixel, followed by calculating the second sample for each pixel and thereby calculating two samples for each pixel as an intermediate result in his calculation step.

It would have been obvious to one of the ordinary skill in the art to have calculated two samples values of the four samples in a sample pattern, either one-by-one sample consecutively or by pair-wise samples simultaneously, in whatever manner. This calculation does not make it distinct from the prior art Sato reference because Sato calculates four sample values including calculating two sample values. Applicant's claim limitation does not recite "calculating only two sample values for each pixel wherein each pixel only has two samples". The claim limitation of "calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel" set forth in the claim 1 is subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d

1320, 1322 (Fed. Cir. 1989) (“During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, one of the ordinary skill in the art would have realized that calculating four sample values also includes the step of calculating less than three sample values because the final calculation result from the step of calculating four sample values includes the intermediate result from the step of calculating less than three sample values. This kind of calculation is well known to one of the ordinary skill in the art. One of the ordinary skill in the art would have been motivated to construct an intermediate step for calculating the four sample values including the intermediate step of calculating less than three sample values.

Claim 15:

The claim 15 encompasses the same scope of invention as that of claim 14 except additional claimed limitation that a first sampling pattern defines sample positions relative to a

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given pixel on opposite sides of a line parallel to a first axis of the image and dividing the respective pixel in two, and a second sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a second axis of the image and dividing the respective pixel in two.

However, Sato further discloses the claimed limitation of that a first sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a first axis of the image and dividing the respective pixel in two, and a second sampling pattern defines sample positions relative to a given pixel on opposite sides of a line parallel to a second axis of the image and dividing the respective pixel in two (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 16:

The claim 16 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the second sampling pattern comprises a sampling pattern substantially corresponding to the first sampling pattern rotated 90 degree.

However, Sato further discloses the claimed limitation that that the second sampling pattern comprises a sampling pattern substantially corresponding to the first sampling pattern rotated 90 degree (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90*

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degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14).

Claim 17:

The claim 17 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the sampling patterns alternate per pixel along at least one row or column of pixels.

However, Sato further discloses the claimed limitation that the sampling patterns alternate per pixel along at least one row or column of pixels (*Sato discloses the sampling patterns alternating for adjacent pixels along a row or column of pixels in an image; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

Claim 18:

The claim 18 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that each of the two sampling patterns is applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees.

However, Sato further discloses the claimed limitation that each of the two sampling patterns is applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the*

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sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14).

Claim 19:

The claim 19 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that the sampling pattern for each consecutive pixel alternates along a row or column of pixels between a given sampling pattern and its 90 degrees-rotated counterpart.

However, Sato further discloses the claimed limitation that the sampling pattern for each consecutive pixel alternates along a row or column of pixels between a given sampling pattern and its 90 degrees-rotated counterpart (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14).*

Claim 20:

The claim 20 encompasses the same scope of invention as that of claim 15 except additional claimed limitation that all sampling patterns are considered as dividing the regions of respective pixels into the same four-by-four array of sub-regions and four potential sample positions are arranged within the array in a manner whereby no two potential sample positions are located in the same row, column, or diagonal of sub-regions, the plurality of sampling patterns comprising first and second sampling patterns, each defining two sampling positions

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from the four potential sampling positions, the first sampling pattern having sample locations in the first and fourth rows of the array and the second sampling pattern having sample locations in the second and third rows of the array.

However, Sato further discloses the claimed limitation that all sampling patterns are considered as dividing the regions of respective pixels into the same four-by-four array of sub-regions and four potential sample positions are arranged within the array in a manner whereby no two potential sample positions are located in the same row, column, or diagonal of sub-regions, the plurality of sampling patterns comprising first and second sampling patterns, each defining two sampling positions from the four potential sampling positions, the first sampling pattern having sample locations in the first and fourth rows of the array and the second sampling pattern having sample locations in the second and third rows of the array (*the first axis is the x-axis and the second axis is the y-axis. Samples are distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the x-axis and the middle line. Samples are also distributed on the two regions separated by the middle line of the 4 by 4 sub-pixel matrix parallel to the y-axis; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 21:

The claim 21 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of the sampling pattern alternating per pixel along at least one row or column of pixels. However, Sato further discloses the claimed limitation of the sampling pattern alternating per pixel along at least one row or column of pixels (*Sato discloses the sampling patterns alternating for adjacent pixels along a row or column of pixels in an image; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

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Claim 22:

The claim 22 encompasses the same scope of invention as that of claim 14 except additional claimed limitation of each of the two sampling patterns being applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees. However, Sato further discloses the claimed limitation of each of the two sampling patterns being applied to every other pixel along at least one row or column of pixels, the second sampling pattern substantially corresponding to the first sampling pattern rotated 90 degrees (*Sato discloses selecting sampling pattern from a plurality of sampling patterns from the pattern table at the predetermined condition. Sato further teaches rotating the sampling locations 180 degree. An alternative sampling pattern with sample positions rotated 90 degree from the sampling pattern of the last pixel can be selected for the present pixel from the pattern table; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

Claim 41:

Sato teaches a method for calculating values for pixels of an image having its pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with one or more sample patterns (*e.g., the sample patterns are different because the sampling locations are different from pixels in the same row. The sampling patterns are different because the sampling rates are*

different from pixels in the same column. Fig. 31 of Sato discloses one sample pattern, Fig. 32 discloses another sample pattern and Fig. 35 discloses two sample patterns), the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions each sampling pattern having at least two sample locations relative to a pixel, each sample location located at one of four candidate sampling locations, and the candidate sampling locations arranged in a manner whereby no two of the four candidate sample locations for a given sampling pattern are located along the same row, column, or diagonal of sub-regions, at least one sampling pattern including at least one other sampling location not located in one of the candidate sampling locations, no more than seven sub-regions containing any sampling location (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*); and

Calculating values for pixels of the image from sample values calculated from respective pixels (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Sato does not expressly disclose the claim limitation, “the sampling pattern having less than three sample locations relative to a pixel” within “calculating sample values for pixels of the image in accordance with a sampling pattern, the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions, the sampling pattern having only two sample locations relative to a pixel, each sample location located at one of four candidate sampling locations.”

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel including calculating one sample value, two sample values, three sample values and then four sample values for a sampling pattern for each pixel. Therefore, Sato teaches or suggests the claim limitation of “calculating less than three sample values for pixels of

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an image in accordance with a sampling pattern for each pixel. Moreover, applicant's method claim includes the term "comprising". Sato has four samples for each pixel and Sato's calculation includes calculating the first sample for each pixel, followed by calculating the second sample for each pixel and thereby calculating two samples for each pixel as an intermediate result in his calculation step. In Sato's calculating of the sample values, one, two, three or four samples are selected from the four samples for a pixel and thereby such sampling also forms a sampling pattern at least in the intermediate calculation. Moreover, applicant failed to particularly point out that sampling only two points has any advantage over sampling only three points, or four points. Applicant failed to point out any particular reason as to why the sample points are limited to two when four candidate sampling locations are arranged and only two sample locations are used for calculating the sample values. Applicant's sampling pattern is well known to one of the ordinary skill in the art.

It would have been obvious to one of the ordinary skill in the art to have calculated two samples values of the four samples in a sample pattern, either one-by-one sample consecutively or by pair-wise samples simultaneously, in whatever manner. This calculation does not make it distinct from the prior art Sato reference because Sato calculates four sample values including calculating two sample values. Applicant's claim limitation does not recite "a pixel has only one sampling pattern and the sampling pattern has only two sample locations". However, applicant's claim 41 recites calculating sample values in accordance with one or more sampling patterns and each sampling having less than three sample locations relative to a pixel. Such claim limitation is vaguely construed, a sampling pattern may be formed in the calculation of the sample values

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such as the calculation of the two sample values at two sampling locations wherein two sampling locations thus selected for the calculation also forms a sampling pattern.

The claim limitation of “each sampling pattern having less than three sample locations relative to a pixel” is thus subject to the broadest interpretation consistent with applicant’s specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In *re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted “in view of the specification” without importing limitations from the specification into the claims unnecessarily). In *re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (“During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). A *prima facie* case of unpatentability is established when the information compels a conclusion that a claim is

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unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, one of the ordinary skill in the art would have realized that calculating four sample values also includes the step of calculating less than three sample values because the final calculation result from the step of calculating four sample values includes the intermediate result from the step of calculating less than three sample values. This kind of calculation is well known to one of the ordinary skill in the art. One of the ordinary skill in the art would have been motivated to construct an intermediate step for calculating the four sample values including the intermediate step of calculating less than three sample values wherein one of the ordinary skill in the art knows that less than three sample values forms a pattern.

4. Claim 42:

Sato teaches a method for calculating values for pixels of an image having its pixels arranged in rows and columns parallel to first and second perpendicular axes, respectively, comprising:

Calculating sample values for pixels of the image in accordance with a sample pattern, the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions, the sampling pattern having two sample locations relative to a pixel, each sample location located at one of four candidate sampling locations, and the candidate sampling locations arranged in a manner whereby no two of the four candidate sample

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locations for a given sampling pattern are located along the same row, column, or diagonal of sub-regions (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*); and

Calculating values for pixels of the image from sample values calculated from respective pixels (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Sato does not expressly disclose the claim limitation, “the sampling pattern having only two sample locations relative to a pixel” within “calculating sample values for pixels of the image in accordance with a sampling pattern, the region of potential sampling locations relative to a pixel considered as divided evenly into a four-by-four array of sub-regions, the sampling pattern having only two sample locations relative to a pixel, each sample location located at one of four candidate sampling locations.”

Sato teaches calculating four sample values for pixels of an image in accordance with a sampling pattern for each pixel including calculating one sample value, two sample values, three sample values and then four sample values for a sampling pattern for each pixel. Therefore, Sato teaches or suggests the claim limitation of “calculating less than three sample values for pixels of an image in accordance with a sampling pattern for each pixel. Moreover, applicant’s method claim includes the term “comprising”. Sato has four samples for each pixel and Sato’s calculation includes calculating the first sample for each pixel, followed by calculating the second sample for each pixel and thereby calculating two samples for each pixel as an intermediate result in his calculation step. In Sato’s calculating of the sample values, one, two, three or four samples are selected from the four samples for a pixel and thereby such sampling also forms a sampling pattern at least in the intermediate calculation. Moreover, applicant failed to particularly point out that sampling only two points has any advantage over sampling only

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three points, or four points. Applicant failed to point out any particular reason as to why the sample points are limited to two when four candidate sampling locations are arranged and only two sample locations are used for calculating the sample values. Applicant's sampling pattern is well known to one of the ordinary skill in the art.

It would have been obvious to one of the ordinary skill in the art to have calculated two samples values of the four samples in a sample pattern, either one-by-one sample consecutively or by pair-wise samples simultaneously, in whatever manner. This calculation does not make it distinct from the prior art Sato reference because Sato calculates four sample values including calculating two sample values. Applicant's claim limitation does not recite "a pixel has only one sampling pattern and the sampling pattern has only two sample locations". However, applicant's claim 41 recites calculating sample values in accordance with one or more sampling patterns and each sampling having less than three sample locations relative to a pixel. Such claim limitation is vaguely construed, a sampling pattern may be formed in the calculation of the sample values such as the calculation of the two sample values at two sampling locations wherein two sampling locations thus selected for the calculation also forms a sampling pattern.

The claim limitation of "each sampling pattern having only two sample locations relative to a pixel" is thus subject to the broadest interpretation consistent with applicant's specification.

During patent examination, the claims are given the broadest reasonable interpretation consistent with the specification. See *In re Morris*, 127 F.3d 1048, 44 USPQ2d 1023 (Fed. Cir. 1997). See MPEP § 2111 - § 2116.01 for case law pertinent to claim analysis. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997).

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Limitations appearing in the specification but not recited in the claim are not read into the claim.

E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted “in view of the specification” without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) (“During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.”). A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

Therefore, in view of Sato, one of the ordinary skill in the art would have realized that calculating four sample values also includes the step of calculating less than three sample values because the final calculation result from the step of calculating four sample values includes the intermediate result from the step of calculating less than three sample values. This kind of calculation is well known to one of the ordinary skill in the art. One of the ordinary skill in the art would have been motivated to construct an intermediate step for calculating the four sample

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values including the intermediate step of calculating less than three sample values wherein one of the ordinary skill in the art knows that two sample values forms a pattern.

Claim 43:

The claim 43 encompasses the same scope of invention as that of claim 42 except additional claimed limitation of the two sample locations located in the first and fourth rows of the array of sub-regions.

However, Sato further discloses the claimed limitation of the two sample locations located in the first and fourth rows of the array of sub-regions (see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).

Claim 44:

The claim 44 encompasses the same scope of invention as that of claim 43 except additional claimed limitation of the two sample locations located substantially at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located substantially at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14*).

Claim 45:

The claim 45 encompasses the same scope of invention as that of claim 43 except additional claimed limitation of the two sample locations located at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-*

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region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).

Claim 46:

The claim 46 encompasses the same scope of invention as that of claim 42 except additional claimed limitation of the two sample locations located in the second and third rows of the array of sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located in the second and third rows of the array of sub-regions (*see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

Claim 47:

The claim 47 encompasses the same scope of invention as that of claim 446 except additional claimed limitation of the two sample locations located substantially at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located substantially at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

Claim 48:

The claim 48 encompasses the same scope of invention as that of claim 46 except additional claimed limitation of the two sample locations located at the center of respective sub-regions. However, Sato further discloses the claimed limitation of the two sample locations located at the center of respective sub-regions (*e.g., each sub-pixel sample area forms a sub-region and therefore each sampling location lies at the center of a sub-region; see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8, 11-12; 13-14).*

5. Claims 86:

The claim 86 encompasses the same scope of invention as set forth in claim 1 except additional claimed limitation of sampling at only two sample locations relative to a pixel in accordance with a sampling pattern and an apparatus for rendering of an image. However, Sato further discloses the claimed limitation of sampling at only two sample locations relative to a pixel in accordance with a sampling pattern and alternating along the y-axis (*e.g., Fig. 32*) and an apparatus for rendering of an image (*see Figs. 2-22*).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato) in view of Wong et al. U.S. Pat. No. 6,501,483 (hereinafter Wong).

Re Claims 29-32:

The claims encompass the same scope of invention as that of claim 27 except additional claimed limitation of the first sampling rate being two samples per pixel and the second sampling rate being one sample per pixel.

Wong teaches at the block 542 of Fig. 7, selecting a sampling pattern from a plurality of sampling patterns shown in figures 5A-5L, and based on the super-sample pattern utilized, the location of the sub-pixel associated with each super-sample is determined according to the pattern shown in figures 5A-5L.

It would have been obvious to one of ordinary skill in the art to have incorporated the Wong's super-sampling patterns into the Sato's pattern table to select sampling patterns for pixels because Sato teaches selecting a sparse sampling pattern in accordance to the predetermined condition such as the selection by the random number generator or a pattern table (*see Sato Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*) and therefore suggesting two different sampling patterns can be selected for consecutive pixels. Moreover, Wong teaches non-uniform sampling patterns and non-uniform pixel changes and further teaches that the determination of the appropriate super-sampling pattern to use is somewhat subjective (e.g., Wong column 5, lines 49-67) and therefore suggesting two different sampling patterns can be selected for consecutive pixels.

One having the ordinary skill in the art would have been motivated to do this because it would have provided a routine experimentation of the test sampling patterns to possibly reduce visible or invisible aliasing noise or to reduce signal to noise ratio by employing the alternating sampling patterns for the consecutive pixels (*see Sato Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14*).

8. Claims 65-66, 72-75, 77, 79, 81, 83, and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. U.S. Pat. No. 6,731,301 (hereinafter Sato) in view of Don P.

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Mitchell, "Generating Antialiased Images at Low Sampling Densities", Computer Graphics, Vol. 21, No. 4, July 1987, pp. 65-72 (hereinafter Mitchell).

Re Claims 65-66, 72-75, 77, 79, 81, 83, and 85:

The claims encompass additional claimed limitation of selecting the one sampling pattern comprising randomly selecting one sampling pattern from the plurality of patterns.

Sato is silent to the claimed limitation of selecting the one sampling pattern comprising randomly selecting one sampling pattern from the plurality of patterns.

However, Mitchell teaches a non-uniform or adaptive sampling patterns with variations in local sampling densities for super-sampling cells or pixel regions or pixels and the sampling pattern is randomly selected (e.g., Mitchell page 67-68).

To illustrate how Mitchell's teaching can be used to construct the sampling pattern for a given pixel determined by a calculation based upon the row and/or column containing the pixel, Mitchell discloses each new sampling location is generated if it falls outside a certain distance of any previously chosen sampling locations in super-sampling (Mitchell page 66) and an offset can be added to the sample positions to generate new sampling pattern (Mitchell page 66). Mitchell further discloses a reconstruction filter which determines the number and locations of the sampling points and thereby determines the sampling pattern for each pixel because the filter kernel is pixel position and sampling location dependent (Mitchell page 67). Therefore, Mitchell teaches the sampling density can be constructed to change with respect to pixel positions in a way that can be determined by the filter kernel function of the pixel position. Therefore, by using the sampling location selection scheme or by the filter kernel selection, Mitchell's teaching may

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generate varying sampling densities such as the sampling pattern for a given pixel determined by a calculation based upon the row and/or column containing the pixel.

It would have been obvious to one of ordinary skill in the art to have incorporated the Mitchell's non-uniform or adaptive sampling for super-sampling cells into the Sato's invention to select sampling patterns for pixels because Sato teaches selecting a sparse sampling pattern in accordance to the predetermined condition such as the selection by the random number generator or a pattern table (see Figs. 26, 29, 34, 36, and 38; col. 2, 4, 8-10, 11-12; 13-14) and therefore suggesting two different sampling patterns can be selected for consecutive pixels. Moreover, while it is known to one of the ordinary skill in the art that super-sampling yields less aliasing, however, Applicant apparently fails to establish the criticality of the specific way of non-uniform or adaptive sampling using two different sampling patterns for consecutive pixels.

One having the ordinary skill in the art would have been motivated to do this because it would have provided a routine experimentation of the test sampling patterns to possibly reduce visible or invisible aliasing noise or to reduce signal to noise ratio by employing the non-uniform sampling patterns for the different pixels (e.g., Mitchell page 66-68).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (571) 272-7665. The examiner can normally be reached on 8:00 - 6:30 (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on (571) 272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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